

Smoldering Eucalyptus and Red Oak Smoke Inhibit Respiration in an Allergic Asthma Mouse Model

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Short- and long-term exposures to biomass wildfire smoke pose significant health risks to firefighters and impacted communities. Susceptible populations including asthmatics may be particularly sensitive to the effects of biomass smoke emissions. We examined pulmonary responses to biomass smoke generated from eucalyptus, Irish peat, or red oak burns under low temperature smoldering or high temperature flaming conditions in female control and house dust mite (HDM)-allergic Balb/ cJ mice. For each fuel type, particulate matter levels were maintained at ~40 (smoldering) or ~3.5-4 (flaming) mg/m³ while CO levels were comparable (~60-120 ppm) under both conditions. Control and HDMsensitized mice (n= 8/group) were challenged with HDM 1 day before exposure to air or biomass smoke for 1 hour/day for 2 consecutive days. Pulmonary responses were assessed using head-out plethysmography chambers to measure thoracic flow and ventilatory parameters prior to (20 min) and during (1 hr) biomass smoke exposure. Both smoldering eucalyptus and red oak reduced breathing frequency in control and HDM-allergic mice. These fuel types also significantly elevated inspiratory time under smoldering conditions compared to the flaming treatment groups. Under flaming conditions, eucalyptus and red oak significantly increased minute volume and peak inspiratory flow. These changes were observed during both days of exposure. However, relaxation time was significantly prolonged during day 1 exposure to smoldering eucalyptus only. In contrast, peat exposure did not alter these ventilatory parameters under either condition. We conclude that exposure to eucalyptus or red oak smoke inhibits respiration to a greater degree than peat smoke under smoldering conditions. This abstract does not represent US EPA policy.